Citation:

Hodge AM, English DR, O'Dea K, Giles GG. Glycemic index and dietary fiber and the risk of type 2 diabetes. *Diabetes Care.* 2004 Nov; 27(11): 2,701-2,706.

PubMed ID: 15505008

Study Design:

Prospective Cohort Study

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To examine the associations between type 2 diabetes and fiber, glycemic load (GL), glycemic index (GI) and fiber-rich foods.

Inclusion Criteria:

- The Melbourne Collaborative Cohort Study recruited 41,528 people (17,049 men) between 1990 and 1994
- The subjects' age range was 27 to 75 years at baseline (99.3% were 40 to 69 years of age)
- The study included 5,425 migrants from Italy and 4,535 from Greece or Macedonia
- The Cancer Council Victoria's Human Research Ethics Committee approved the study protocol
- Subjects gave written consent to participate and to obtain access to their medical records.

Exclusion Criteria:

- Diabetes at baseline (self-reported, plasma glucose of N=1,549 or elevated plasma glucose of N=324)
- Reported having angina or suffering a heart attack before baseline
- Did not report diabetes at baseline but later reported a date of diabetes diagnosis before baseline
- Energy intakes in the top or bottom 1% of the sex-specific distributions
- Missing values for relevant risk factors measured at baseline.

Description of Study Protocol:

- This was a prospective study of 36,787 men and women aged 40 to 69 years without diabetes
- For all self-reported cases of diabetes at four-year follow-up, confirmation of diagnosis was

sought from medical practitioners
- Case subjects were those who reported diabetes at follow-up and for whom there was no evidence that they did not have type 2 diabetes
- Data were analyzed with logistic regression, adjusting for country of birth, physical activity, family history of diabetes, alcohol and energy intake, education, five-year weight change, sex and age.

Data Collection Summary:

- Incident cases of diabetes were identified from a self-administered questionnaire mailed to participants four years after baseline
- For all self-reported incident case subjects except those who reported a diagnosis date before baseline and who were excluded, confirmation of diagnosis was sought from doctors nominated by participants. Doctors were asked to specify if the participant had diabetes and, if so, to indicate whether it was type 1 or 2
- Dietary information was collected using a 121-item, self-administered, food-frequency questionnaire (FFQ) specifically developed for the Melbourne Collaborative Cohort Study. To calculate nutrient intakes, sex-specific standard portions were used, together with Australian food-composition data
- Dietary GL was computed by summing the product of carbohydrate intake from each food by the GI for that food. GL was divided by total carbohydrate intake to obtain dietary GI (i.e., an average of individual food GI values, weighted according to their contribution to carbohydrate intake)
- GI values of individual food items were obtained from the 2002 international table of GI and GL values.

Description of Actual Data Sample:

- *Initial N:* 41,528
- *Attrition (final N):* 86% of subjects completed the follow-up
- *Age range:* 27 to 75 years at baseline (99.3% were 40 to 69 years of age)
- *Ethnicity:* Australian, Italian, Greek
- *Demographics:* 5,425 migrants from Italy and 4,535 from Greece or Macedonia
- *Anthropometrics:* People who completed follow-up had similar levels of risk factors for type 2 diabetes compared with those who did not complete the questionnaire (mean age 54.3 vs. 54.5 years and mean fasting plasma glucose 5.5 vs. 5.5mmol per L, respectively), although BMI was slightly lower (mean 26.6 vs. 27.2kg/m^2, respectively)
- *Location:* Australia.

Summary of Results:

- Follow-up was completed by 31,641 (86%) participants and 365 cases were identified
- The odds ratio (OR) for the highest quartile of white bread intake compared with the lowest was 1.37 (95% CI: 1.04 to 1.81; P for trend = 0.001). Intake of carbohydrate (OR per 200g per day 0.58, 0.36 to 0.95), sugars (OR per 100g per day 0.61, 0.47 to 0.79) and magnesium (OR per 500 mg per day 0.62, 0.43 to 0.90) were inversely associated with incidence of diabetes

- Intake of starch (OR per 100g per day 1.47, 1.06 to 2.05) and dietary GI (OR per 10 units 1.32, 1.05 to 1.66) were positively associated with diabetes
- These relationships were attenuated after adjustment for BMI and waist-to-hip ratio.

Author Conclusion:

Reducing dietary GI while maintaining a high carbohydrate intake may reduce the risk of type 2 diabetes. One way to achieve this would be to substitute white bread with low-GI breads.

Reviewer Comments:

None.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions		
1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes

2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	Yes
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	???
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	N/A

5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	???
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	N/A
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes

8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes